

International Global Atmospheric Chemistry Programme

Global Emissions Inventory Activity

Working Group on Anthropogenic Emissions of SO₂ and NO_x

Current Status¹

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This working group is addressing the compilation of global, gridded inventories of anthropogenic emissions of SO₂ and NO_x.

Inventories of Anthropogenic Emissions of SO₂ and NO_x for 1985.

Version 1 of the global gridded inventories of anthropogenic emissions of SO₂ and NO_x were completed and have been release to the scientific community. Version 1A includes annual emissions; a manuscript describing the work has been submitted to the Journal of Geophysical Research for publication in the special NARE section (Benkovitz, 1995). Version 1B includes seasonal emissions by industrial sector and with two vertical levels (above and below 100 m); a manuscript describing the work is in preparation (Voldner et al., 1995).

The same data sets were used for both versions of the GEIA, therefore emissions totals across both inventories agree. The inventories are distributed to a 1° × 1° longitude/latitude grid and include the most current information from the NAPAP regional inventories for the United States and Canada (Saeger et al., 1989), EMEP and CORINAIR85 for Europe (Bouscaren, 1992; Sandnes and Styve, 1992), Asia (Kato and Akimoto, 1992; Tonooka, personal communication, 1993), Australia (Horseman and Carnovale, 1989; Carnovale et al., 1992), and South Africa (Loyd, personal communication, 1993). SO_x emissions for other regions of the globe were taken from the work by Spiro et al. (1992) updated to 1985; NO_x emissions were taken from the work by Dignon (1992). Diagrams of the relationship between the default inventories and the regional inventories used are presented in Figure 1.

The global anthropogenic emissions from Version 1A are 65.1 Tg S y⁻¹ and 21.0 Tg N y⁻¹. Emissions of both SO_x and NO_x are strongly localized in the highly populated and industrialized areas of Eastern North America, and across Europe; other smaller regions of large emissions are associated with densely populated areas with developed industries or in connection with exploitation of fuels or mineral reserves. The molar ratio of nitrogen to sulfur emissions reflects

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the overall character of sources; its value is generally between 0.33 and 10 for industrialized and heavily populated areas, but varies over a wide range for other areas. Due to the lack of information on the uncertainty of the parameters used to estimate the emissions, a qualitative uncertainty estimate was assigned to the emissions estimates by regions according to the level of regional detail in the methodology and data used to prepare these estimates.

Anthropogenic Emissions of SO_x for 1990.

A collaborative effort between RIVM, Bilthoven, The Netherlands, IMW-TNO, Delft, The Netherlands and Brookhaven National Laboratory, Upton, NY, USA is addressing the compilation of an inventory of anthropogenic emissions of SO₂ for 1990. The Dutch effort is part of the Emission Database for Global Atmospheric Research (EDGAR) project (Baars et al., 1991; Berdowski, 1992; Olivier et al., 1994). The BNL work is funded by the Department of Energy. Initial estimates of the per country emissions have been obtained for all industrial sectors except combustion of industrial waste, charcoal coal combustion, combustion of other biofuels, savannah burning and forest and agricultural waste burning. Work is in progress to estimate emissions from the missing sectors and to refine those initial estimates. After the per country estimates have been completed the task of selecting the surrogate files and allocating the emissions to the 1° × 1° GEIA grid will be addressed.

The GEIA inventories will be periodically updated; however, except for correcting major errors, the frequency of updating will be chosen so that users will have ample time to perform their studies and reach their conclusions before the next version of a GEIA inventory is released.

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